

2008 MONTANA NATURAL EVENTS ACTION PLAN

- for the -

MITIGATION OF PUBLIC HEALTH IMPACTS CAUSED BY SMOKE FROM WILDFIRE EVENTS

Department Hearing

December 7, 2007

**Montana Department of Environmental Quality
Permitting & Compliance Division
1520 East Sixth Avenue
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Bureau of Land Management: Karen Michaud, 896-2911.

National Park Service: Contact individually.

Fish and Wildlife Service: Contact individually.

Private Commercial Land Owners: Contact individually.

Private Non-Commercial Land Owners: Contact individually.

INTERNET LINKS

American Lung Association	http://www.lungusa.org
Centers For Disease Control	http://www.cdc.gov/
FEMA	http://www.fema.gov
Montana DEQ Smoke Update	http://www.deq.mt.gov/
Montana Disaster & Emergency Services	http://dma.mt.gov/des/
Montana Fire Recovery Information	http://newslinks.mt.gov/recovery.shtml
Montana / Idaho Airshed Group	http://www.smokemu.org/
National Highway Traffic Safety Admin	http://www.nhtsa.dot.gov/
National Interagency Fire Center NIFC Safety	http://www.nifc.gov/safety_study/
National Interagency Fire Center (NIFC)	http://www.nifc.gov
National Park Service	http://www.nps.gov/nifc/fire/fir_wildland.cfm
Northern Rockies Coordination Center	http://gacc.nifc.gov/nrcc
National Wildfire Coordinating Group (NWCG)	http://www.nwcg.gov
National Wildland/Urban Interface (FIREWISE)	http://www.firewise.org/
National Wildand Coordinating Group	http://www.nwcg.gov/
OSHA	http://www.osha.gov
U.S. Fish & Wildlife Service Fire Management	http://www.fws.gov/fire
United States Forest Service Fire & Aviation	http://www.fs.fed.us/fire/safety
Weather & Satellite Image Links	http://www.osei.noaa.gov/Events/Fires/

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GLOSSARY

Exceptional Event. An event that affects air quality, is not reasonably controllable or preventable, is an event caused by human activity that is unlikely to recur at a particular location or a natural event, and is determined by EPA in accordance with 40 CFR 50.14 to be an exceptional event. It does not include stagnation of air masses or meteorological inversions, a meteorological event involving high temperatures or lack of precipitation, or air pollution relating to source noncompliance.

Fire Management Plan. A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational procedures such as preparedness plans, preplanned dispatch plans, prescribed fire plans, and prevention plans.

Natural Event. An event in which human activity plays little or no direct causal role.

Policy. EPA policies including Guideline on the Identification and Use of Air Quality Data Affected by Exceptional Events (1986); a memorandum dated May 30, 1996 regarding Areas Affected by PM-10 Natural Events; a Note dated August 17, 1998 regarding Implementation of the PM-10 Natural Events Policy; and a note dated October 20, 1003 regarding policy on PM-2.5 Natural Events issues.

Prescribed Fire. Any fire ignited by management actions to meet specific objectives. A written, approved fire management plan must exist, and NEPA requirements must be fulfilled, prior to ignition.

Program. Reference to the Montana / Idaho State Airshed Group.

Regulations. EPA rules as outlined in 40 CFR Part 50, Appendixes K, I and N.

Wildfire. Any unwanted wildland fire.

Wildfire Event. Any individual wildfire, or collection of wildfires that is determined to impact air quality, public health, and/or visibility.

Wildland Fire. Any non-structure fire, other than prescribed fire, that occurs on wildland.

Wildfire Season. The period beginning on May 1 and ending September 30 of any year.

ACRONYMS

ACP	Air Compliance Program, DEQ
AIRS	Aerometric Information Retrieval System
AIRS-AQS	Aerometric Information Retrieval System – Air Quality Subsystem
AMP	Air Monitoring Program, DEQ
APP	Air Permitting Program, DEQ
AQCR	Air Quality Control Region
AQPP	Air Quality Policy & Planning Program, DEQ
BACM	Best Available Control Measures
BACT	Best Available Control Technology
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
DC	Disaster Coordinator
DEQ	Montana Department of Environmental Quality
DPHHS	Department of Public Health and Human Sciences
EPA	United States Environmental Protection Agency
NAAQS	National Ambient Air Quality Standard
NAMS	National Air Monitoring Station
NEAP	Natural Events Action Plan
O ₃	Ozone
PIO	Public Information Officer
PM	Particulate Matter
PM-2.5	Particulate Matter with an aerometric diameter equal to 10 microns or less
PM-10	Particulate Matter with an aerometric diameter equal to 2.5 microns or less
PSA	Public Service Announcement
RACM	Reasonably Available Control Measures
SE	State Epidemiologist
SLAMS	State and Local Air Monitoring Station
SMO	State Medical Officer

1.0 INTRODUCTION

Federal, state, and local agencies have limited abilities to control particulate matter (PM) emissions caused by wildfires. Particulate Matter with an aerometric diameter equal to 10 microns or less (PM-10) and 2.5 microns or less (PM-2.5) monitoring values recorded during a wildfire event may be sufficient to cause violations of the National Ambient Air Quality Standards (NAAQS) and result in a U.S. Environmental Protection Agency (EPA) designation of nonattainment. Inclusion of such values into the monitoring data record may result in an inappropriate estimate of expected historical daily and annual values. Additionally, PM emissions from wildfires often leads to conditions of reduced air quality, public health, and visibility impairment.

Historically, EPA adopted 40 CFR Part 50, Appendixes K, I, and N (Regulations) for making appropriate data adjustments to standard air quality monitoring data for exceptional events and trends. The Regulations are applicable whenever the interpretation of NAAQS data is affected by uncontrollable events caused by natural sources of PM-10 and/or PM-2.5.

On March 22, 2007 (72 FR 13560), EPA publish the final rule addressing the treatment of data influenced by exceptional events, or “Exceptional Events Rule”. Revisions to 40 CFR Parts 50 and 51 were made to outline the process whereby states may petition EPA to exclude or “flag” data from regulatory determinations relating to exceedances or violations of NAAQS. States must adequately demonstrate that an exceptional event has caused an exceedance or violation of a NAAQS. The Exceptional Events Rule became effective on May 21, 2007 and is attached as Appendix A.

Mitigation requirements outlined in 40 CFR Part 51.930 - Subpart Y require states to take appropriate and reasonable actions to protect public health from exceedances or violations of the NAAQS. At a minimum, states must: (1) provide for prompt public notification whenever air quality concentrations exceed or are expected to exceed an applicable NAAQS; (2) provide for public education concerning actions that individuals may take to reduce exposures to unhealthy levels of air quality during and following an exceptional event; and (3) provide for the implementation of appropriate measures to protect public health from exceedances or violations of NAAQS caused by exceptional events.

The Montana Natural Events Action Plan (NEAP) is the planning tool to assist in mitigating public health impacts from the effects of wildfire smoke emissions and to fulfill the requirements of 40 CFR 51.930. Although other emissions caused by wildfire is carbon monoxide (CO) and ozone (O₃), these pollutants are not currently addressed by the NEAP. The Exceptional Events Rule preamble states that only particulate matter and ozone emissions will be considered under the rule.

2.0 SCOPE

The Plan facilitates coordination among federal, state, and local agencies to respond to smoke from wildfires with effective communications addressing public exposure to PM and visibility impairment. The Plan outlines strategies to educate the public about smoke from wildfire, mitigate human health impacts, and to identify and implement Best Available Control Measures (BACM) for anthropogenic sources of smoke emissions. The Plan will take effect each time a wildfire is determined to threaten air quality and/or public health. Each wildfire that is determined to cause inappropriate PM exceedances or averages shall be documented as set forth in the Plan and submitted as a separate document to the Plan. The following sections describe the historical background of wildland fire, the chemical composition of smoke, and the public health and visibility effects of smoke.

2.1 Historical Background of Wildland Fire

Wildland fire was once the most prevalent disturbance in Montana. Before the turn of the century, approximately half of western forests burned every 100 years and stands less than 40 years old made up one third of the forested landscape. Exclusion of wildland fire has resulted in high fuel accumulations and a shift in forest stand composition and age structure, but the effects of fire management on landscape structure and biological diversity have received relatively little attention until recently.

Fire scientists have long recognized that the composition and structure of Montana forests have been strongly influenced by wildland fire. This influence goes back for at least several hundred years. Since 1972, knowledge of wildland fire history in Montana has been expanded by more than a dozen detailed fire ecology studies. The vast forest ecosystems of Montana have evolved for thousands of years. Periodic wildland fires have maintained numerous species as well as a mosaic of habitats that have maximized the natural diversity of the forest community. Just under a century ago, the first professional foresters advocated practices to suppress wildland fires, deeming them wildfires. Wildfire suppression was an attempt to preserve land foresters believed could otherwise be logged or inhabited.

With the advent of large-scale logging operations and the historic wildfires of 1910, a new policy of aggressive wildfire suppression began on America's public lands. What eventually became known as the 10 a.m. policy (a goal of total extinguishment of all wildfires by 10 a.m. the morning after first reported) persisted until 1978. To this day, wildfire suppression on public land generally remains the rule. In the 1930s, the Civilian Conservation Corps, created under President Franklin D. Roosevelt, provided the human power to begin putting out large numbers of small wildfires in the West. Land managers were very successful in campaigning to prevent and suppress

wildfires. A national public relations program, starring Smokey Bear, ingrained in the popular imagination a sense of fear of wildfire and a belief that all wildland fire was bad and highly destructive.

The negative consequences of wildfire suppression can now be clearly seen. In many areas, disruption of the natural fire regime has produced overcrowded forests with vast accumulations of dry fuel. Blazes that break out under these conditions may be far more destructive than the normal wildland fires of centuries past and are often extremely difficult or impossible to control. Fire ecologists have long argued that natural, smaller-sized wildland fires are the best tool for taking out underbrush, small trees and dead wood on a regular basis. Fire ecologists have also discovered that past logging practices have made forests more vulnerable to catastrophic wildfires as foresters harvested large trees and left smaller, more fire-susceptible trees and brush behind. Although most foresters have revised those practices, it will take decades for forests to recover. This combination of heavy forest fuels and periodic drought conditions has lead to disastrous and unpredictable wildfire conditions in Montana. Today, an extreme potential exists for air quality, public health, and visibility impacts caused by smoke from wildfires.

2.2 Chemical Composition of Smoke

The combustion of forest fuels from wildland fire results in the emission of hundreds, if not thousands of chemical compounds into the atmosphere in the form of smoke. Table 1 illustrates the primary constituents of smoke from forest fuels, including CO, water vapor, carbon dioxide (CO₂), PM, hydrocarbons, other organics, and nitrogen oxides.

The two products of complete oxidation (CO₂ and water vapor) make up to 90 percent of the mass emitted. The other ten percent includes virtually all of the smoke and potentially health-threatening compounds. Three products of concern to air quality regulators are CO, O₃, and PM. Suspended particulates are the greatest threat to air quality and public health because they will remain in suspension for periods ranging from a few seconds to several months. Carbon monoxide and O₃ are gases that typically are diluted by normal atmospheric conditions, and therefore may not pose a significant threat to public health.

As combustion efficiency increases, more CO₂ and water vapor are produced. As combustion efficiency decreases, the proportion of undesirable emissions such as CO and PM increase. Wildland fires of low intensity, those in which the flaming combustion phase is barely sustained, produce high CO and PM emissions. Wildland fires exhibit a wide range of combustion efficiencies throughout the course of their existence. Hence, volume and dispersion of smoke is often difficult to predict.

TABLE 1
Range of Emission Factors and Potential Effects From Components
of Wildfire Smoke

Components	Range of Emission Factors (pounds produced per ton of fuel consumed)	Potential Effects
Carbon Dioxide	2,000 to 3,500	Greenhouse gas
Water Vapor	500 to 1,500	Visibility
Carbon Monoxide	20 to 500	Health
Particulate Matter	20 to 180	Visibility & Health
Total Hydrocarbons	10 to 40	Visibility & Health
Other Organics	Unknown	Visibility & Health
Nitrogen Oxides	1 to 9	Visibility & Health
Sulfur Oxides	Trace	Visibility & Health

Source: USDA Southern Forest Fire Laboratory, n.d.

2.3 Public Health and Visibility Effects of Smoke

Particulates are responsible for two major smoke-related problems: respiratory disorders and visibility impairment. The size and content of smoke particulates have significant health implications. Fine particles, PM-2.5 and less, can be drawn into the human lung and may cause damage. Research studies indicate that on average, 90 percent of smoke particles from wildland fire are PM-10, and 70 percent of those particles are PM-2.5. For comparison, a human hair is about 70 microns in diameter.

Particulates may interact with other air pollutants to affect human health. Excessive particulates may interact with emissions such as sulfur dioxide from urban and industrial centers. Sulfur compounds in the air commonly come from pulp mills and from coal-burning power plants. This interaction creates synergistic effects potentially damaging to human health when inhaled. Smoke particles from wildland fire also have a size range near the wavelength of visible light (0.4 - 0.7 micrometers), making particulates excellent light scatterers. Visibility impairment caused by smoke from wildfires may create unsafe conditions for operating vehicles, trains, or aircraft.

3.0 DEQ ACTIONS FOR WILDFIRE EVENTS

For each wildfire event, the Plan requires specific actions to be performed by the Department of Environmental Quality (DEQ), the Department of Public Health and Human Services (DPHHS), and other affected public and private agencies. Organization charts for DEQ and DPPHS are included as Appendix B. A Memorandum of Understanding has been entered into between DEQ and DPHHS and is included as Appendix C.

Other affected parties may include, but are not limited to federal and local health agencies; federal, state, and local disaster and emergency relief agencies; state departments of Labor & Industry and Office of Public Instruction; U.S. Forest Service; National Park Service; Fish and Wildlife Service; Bureau of Land Management; private residential land owners; and private commercial land owners. For each wildfire event, DEQ must ensure the performance of each action as set forth below.

3.1 Action 1: Conduct Routine Ambient Monitoring

Montana has established a network of State and Local Air Monitoring Stations (SLAMS) for NAAQS pollutants, using criteria set by EPA for monitor station location and operation. EPA has also established an additional network of monitors called National Air Monitoring Stations (NAMS). During a wildfire event, continuous PM monitors and National Weather Service airport visibility monitors will be utilized by DEQ to assess PM concentration and geographic extent of smoke. Figure 1 illustrates the communities with continuous PM and airport visibility monitors by each Air Quality Control Region (AQCR).

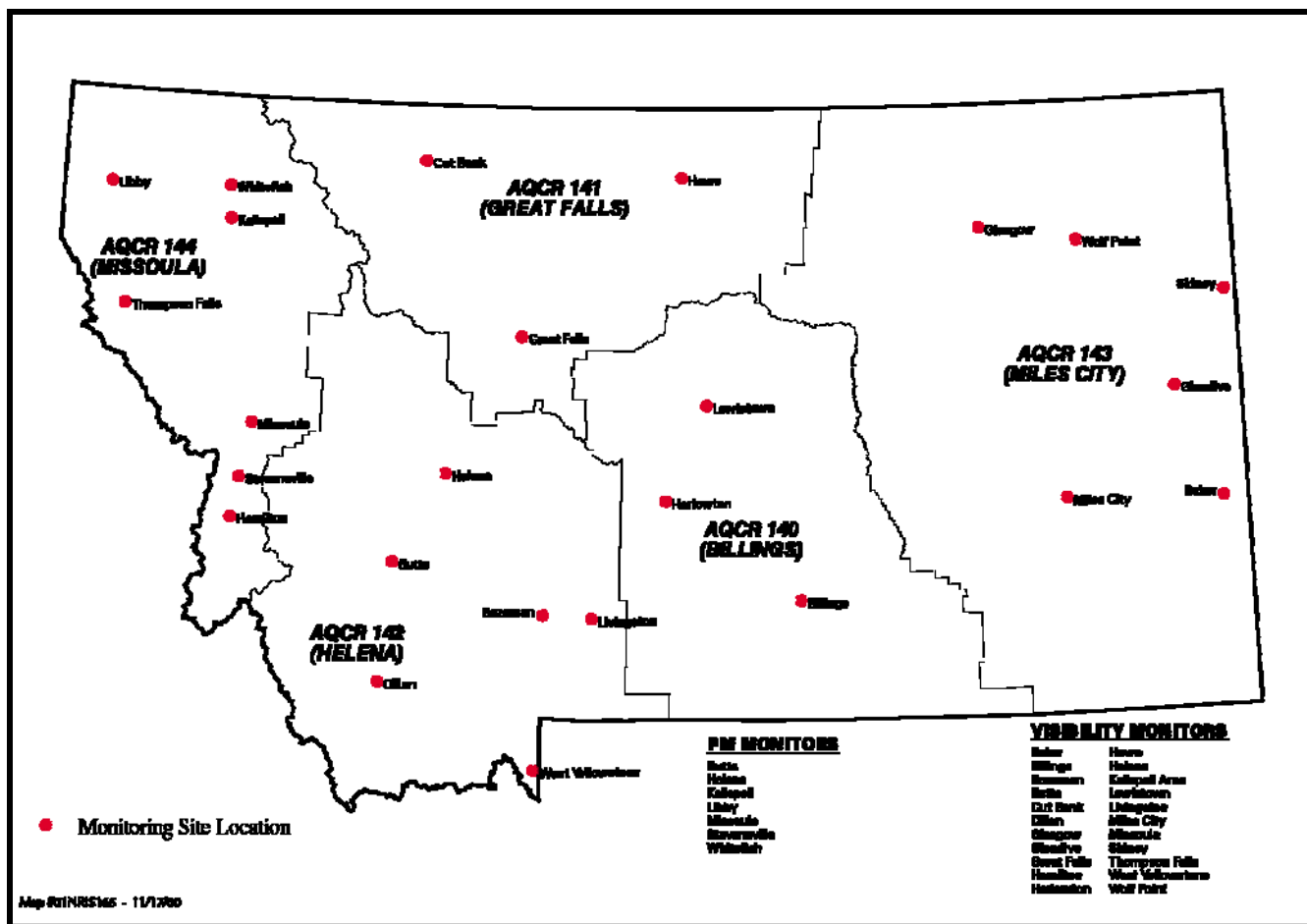


FIGURE 1

Continuous PM and Airport Visibility Monitoring Site Locations by AQCR

Montana's monitoring objectives and the spatial scale of PM monitoring stations are examined to determine whether they represent the air quality conditions of the local area. Background information, such as maps, climatological summaries, emission inventories, traffic counts, and modeling results are gathered and reviewed. The final evaluation of ambient air monitoring placement locations is determined at DEQ's annual network review. Not all communities with PM monitors have continuous monitoring capability. In general, only those communities with residential wood smoke problems received continuous monitors to evaluate air quality in real time. Although continuous PM monitoring information represents local air quality conditions, the relationship between monitoring site locations adequately characterizes regional conditions.

Montana adheres to 40 CFR Part 58 in all data acquisition and archiving activities. As required in 40 CFR §58.35, all NAMS and SLAMS data is submitted to the Air Quality System (AQS) for archiving and to insure the widest possible availability. Table 2 outlines routine monitoring responsibilities.

TABLE 2
Routine Ambient Monitoring Responsibilities

ACTION¹	DEQ	DPHHS	OTHER AFFECTED PARTIES²
Install and maintain SLAMS PM ambient monitoring network	AMP ³	NA	Local Air Pollution Control Program Responsibility ⁴
Gather and interpret ambient monitoring data	AMP	NA	Local Air Pollution Control Program Responsibility
Enter monitoring data into AQS	AMP	NA	Local Air Pollution Control Program Responsibility
Answer routine public questions regarding smoke and visibility ambient monitoring	AMP	NA	As Needed

1 - Action sequence does not connote priority.

2 - Other affected parties may include, but is not limited to federal and local health agencies; federal, state, and local disaster and emergency relief agencies; state departments of Labor & Industry and Office of Public Instruction; U.S. Forest Service; National Park Service; Fish and Wildlife Service; Bureau of Land Management; private residential land owners; and private commercial land owners.

3 - Air Monitoring Program (AMP), DEQ.

4 - Applicable only to counties with state-delegated air pollution control programs with monitoring responsibilities.

3.2 Action 2: Conduct Public Education / Outreach

The purpose of this action is to inform the public about PM and visibility impairment caused by smoke from wildfires. The Department intends to implement public education / outreach actions whenever a wildfire event occurs to notify the public of appropriate actions that could reduce personal exposure to smoke and mitigate visibility impairment. These actions would not constitute medical advice or public health advisories based upon monitored values. Additionally, routine wildfire information such as size, location, evacuations, travel restrictions, etc. are not addressed by the Plan.

The DEQ website is the primary outreach tool for informing the public of health effects caused by smoke from wildfires. The website is entitled “DEQ & Smoke – Smoke Management in Montana – Forest Fire Air Quality updates”. The website provides the reader with a narrative of current air quality conditions and a timely meteorological forecast. The website also includes, but is not limited to, links to visibility ranges and smoke categories. These links provide the public with a discussion of health effects and cautionary statements for taking actions to avoid negative health effects.

The DEQ & Smoke – Smoke Management in Montana – Forest Fire Air Quality updates website is found at:

<http://deq.mt.gov/FireUpdates/index.asp>

The Montana / Idaho State Airshed Group is a state-certified basic smoke management program that works to minimize smoke impacts from prescribed burning while allowing burners to achieve their forest health objectives. Although the Department may curtail prescribed burning during wildfires, airsheds may remain open to prescribed burning, depending upon the individual circumstances. Thus, the DEQ open burning hotline is another tool to communicate to the public the necessity of not contributing additional smoke to the airshed from prescribed burning. Sections 3.5 and 3.6 discuss the state’s smoke management program, seasons of operation, and open burning hotline procedures.

Table 3 outlines public education / outreach responsibilities. Appendix D contains examples of public education / outreach information:

TABLE 3
PUBLIC EDUCATION / OUTREACH RESPONSIBILITIES

ACTION¹	DEQ	DPHHS	OTHER AFFECTED PARTIES²
Information distribution (literature)	AQPP ³ DEQ PIO ⁴	Disaster Coordinator Epidemiologist Medical Officer DPHHS PIO ⁵	As Needed
Prepare and Broadcast PSAs ⁶	AQPP DEQ PIO	Disaster Coordinator Epidemiologist Medical Officer DPHHS PIO	As Needed
Community events to raise awareness of health hazards of smoke	As Needed	As Needed	As Needed
Answer routine public questions regarding smoke	AQPP DEQ PIO	Disaster Coordinator Epidemiologist Medical Officer DPHHS PIO	As Needed
Outdoor burning hotline	AQPP	NA	NA

1 - Action sequence does not connote priority.

2 - Other affected parties may include, but is not limited to federal and local health agencies; federal, state, and local disaster and emergency relief agencies; state departments of Labor & Industry and Office of Public Instruction; U.S. Forest Service; National Park Service; Fish and Wildlife Service; Bureau of Land Management; private residential land owners; and private commercial land owners.

3 - Air Quality Policy & Planning (AQPP), DEQ.

4 - Public Information Officer (DEQ PIO).

5 - Public Information Officer (DPHHS-PIO).

6 - Public Service Announcements (PSAs).

3.3 Action 3: Conduct Data Gathering of Ambient PM Concentrations

As required by the Plan, information for each wildfire event must be gathered to demonstrate that ambient monitoring values were affected by a natural event. Table 4 outlines the data gathering responsibilities.

TABLE 4**Data Gathering of Ambient PM Concentrations Responsibilities**

ACTION¹	DEQ	DPHHS	OTHER AFFECTED PARTIES²
Monitor smoke complaints	ACP ³	NA	As Needed
Monitor visibility impairment classes	AQPP ⁴ AMP ⁵	NA	As Needed
Collect and evaluate ambient monitoring values	AQPP AMP	NA	As Needed
Answer routine public questions regarding smoke and the data collected.	AQPP AMP	NA	As Needed
Conduct individual exposure monitoring	NA	As Needed	As Needed
Answer routine questions regarding occupational exposure and indoor air monitoring	NA	NA	State Department of Labor & Industry

1 - Action sequence does not connote priority.

2 - Other affected parties may include, but is not limited to federal and local health agencies; federal, state, and local disaster and emergency relief agencies; state departments of Labor & Industry and Office of Public Instruction; U.S. Forest Service; National Park Service; Fish and Wildlife Service; Bureau of Land Management; private residential land owners; and private commercial land owners.

3 – Air Compliance Program (ACP), DEQ.

4 – Air Quality Policy & Planning (AQPP), DEQ.

5 – Air Monitoring Program (AQM), DEQ.

3.4 Action 4: Issue Public Health Advisories Based on Measured Concentrations

The purpose of the public health advisory process is to inform the public about specific PM emissions based upon monitored values and to provide periodic information on air quality and visibility impairment. Health advisories issued under this process shall provide specific instructions to the public for taking actions to minimize exposure to high concentrations of PM. The public health advisory action employs various actions depending on the concentration of PM. The actions are not intended to replace the need to control the wildfire event, but are intended to mitigate adverse health effects. Table 5 summarizes the public health advisory responsibilities.

TABLE 5
Issuing Public Health Advisories Based on Measured Concentrations Responsibilities

ACTION¹	DEQ	DPHHS	OTHER AFFECTED PARTIES²
Provide ambient monitoring data on Internet website	AQM ³ AQPP ⁴	NA	As Needed
Provide ambient monitoring data to public health officials	AQM AQPP	NA	Local Air Pollution Control Program Responsibility ⁵
Issue health advisories	NA	NA	Local Health Departments ⁶
Answer routine public questions regarding smoke and health effects	As Needed	As Needed	Local Health Departments

1 - Action sequence does not connote priority.

- 2 - Other affected parties may include, but is not limited to federal and local health agencies; federal, state, and local disaster and emergency relief agencies; state departments of Labor & Industry and Office of Public Instruction; U.S. Forest Service; National Park Service; Fish and Wildlife Service; Bureau of Land Management; private residential land Owners; and private commercial land owners.
- 3 - Air Monitoring Program (AMP), DEQ.
- 4 - Air Quality Policy & Planning (AQPP), DEQ
- 5 – Applicable only to counties with state-delegated air pollution control programs with monitoring responsibilities.
- 6 – Applicable to all local health departments with statutory authority.

3.5 Action 5: Conduct BACM Determination and Implementation

Section 190 of the Clean Air Act Amendments of 1990 require EPA to issue technical guidance for Reasonable Available Control Measures (RACM) and BACM for agricultural and prescribed silvicultural burning. Many of the techniques outlined in EPA's BACM document for prescribed burning (EPA-450/2-92-003) have been incorporated into the Montana / Idaho State Airshed Group (Program). The state air quality permit references the term Best Available Control Technology (BACT) that is required year-round and primarily describes burning conditions associated with good atmospheric ventilation.

Appendix E outlines the Program and some of the BACM techniques. Table 6 outlines the BACM determination and implementation responsibilities.

TABLE 6
BACM Determination and Implementation Responsibilities

ACTION¹	DEQ	DPHHS	OTHER AFFECTED PARTIES²
Implement and manage smoke management plan for major open burning	AQPP ³ APP ⁴	NA	NA
Answer routine public questions regarding smoke management program	AQPP APP	NA	As Needed

1 - Action sequence does not connote priority.

- 2 - Other affected parties may include, but is not limited to federal and local health agencies; federal, state, and local disaster and emergency relief agencies; state departments of Labor & Industry and Office of Public Instruction; U.S. Forest Service; National Park Service; Fish and Wildlife Service; Bureau of Land Management; private residential land owners; and private commercial land owners.
- 3 – Air Quality Policy & Planning (AQPP), DEQ.
- 4 – Air Permitting Program (APP) DEQ.

During a wildfire event, the Program will work to mitigate the effects of additional anthropogenic smoke emissions from prescribed burning on existing smoke conditions. The Program seeks to inform the public about the requirements for major and minor open burners as administered by DEQ under Montana law and the voluntary activities associated with membership in the Montana / Idaho Airshed Group (Airshed Group). A summary of smoke management activities by season is outlined below:

SMOKE MANAGEMENT ACTIVITIES BY SEASON

Spring:

- March 1st, general open burning may be conducted.
- All burners are required to implement BACT.
- No DEQ-sponsored dispersion forecasting for general public use.
- Individual burners may utilize in-house meteorological services.
- Airshed Group members bound by self-imposed restrictions issued by monitoring unit.

Summer:

- General open burning may be conducted.
- All burners are required to implement BACT.
- No DEQ-sponsored dispersion forecasting for general public use.
- Individual burners may utilize in-house meteorological services.
- Airshed Group members bound by self-imposed restrictions issued by monitoring unit.

Fall:

- General open burning may be conducted.
- DEQ sponsors dispersion forecasting recommendations.
- Minor burners are required to call DEQ for dispersion forecast.
- Airshed Group members bound by DEQ restrictions issued by monitoring unit.

Winter:

- General open burning mostly restricted.
- Burners may seek special DEQ permission to burn.

- No DEQ-sponsored dispersion forecasting for general public use.
- Airshed Group members bound by DEQ restrictions issued by monitoring unit.

MONTANA OPEN BURNING RULES

In Montana, prescribed wildland open burning, including Wildland Fire Use, is generally conducted by burners who are burning quantities sufficient to generate emissions that qualify them as major open burners. Major open burning requires a permit in Montana. Major open burners apply to DEQ for a permit to burn and are required to submit certain information regarding planned fires and the requisite fee.

A major open burner is required to conform to BACT requirements and any other conditions set forth in the permit. BACT is essentially a case-by-case analysis of a major burner's techniques and methods of controlling emissions during a burn. BACT for major open burning requires burning only during periods of good dispersion and generally precludes burning during December, January, or February. The final responsibility to determine BACT lies with the burner.

A significant portion of annual prescribed wildland open burning occurs during the fall season (September 1 through November 30). During the fall season, DEQ performs a meteorological forecast to determine dispersion conditions throughout the state and reports the same on a phone message. BACT includes obtaining and following a dispersion forecast prior to igniting a burn. Table 7 outlines smoke management activities by season.

For the entire text of Montana's open burning rules, see:

<http://deq.mt.gov/dir/legal/Chapters/CH08-06.PDF>

TABLE 7
Smoke Management Activities by Season

ACTIVITY/ REQUIREMENT	SPRING Mar 1 – May 31	SUMMER JUN 1 – AUG 31	FALL SEP 1 – NOV 30	WINTER DEC 1 – FEB 28
Implement BACT	X	X	X	X
DEQ Dispersion Forecast Available			X	
Must Follow DEQ Restrictions			X	
Must Obtain DEQ Permission Before Burning				X

Must Comply With Local Program Restrictions	X	X	X	X
Major Burners Comply With MU Restrictions	X	X	X	

MONTANA / IDAHO AIRSHED GROUP

The Airshed Group is a voluntary association of major open burners committed to coordinating activities to mitigate adverse air quality effects of major open burning. The Airshed Group seeks to balance the competing objectives of prescribed burning for land management with maintaining air quality.

As set forth above, Airshed Group members, as major open burners, are required to follow BACT. In addition to the legal requirements, the Airshed Group subscribes to a set of self-imposed requirements set forth in an operating agreement and implements a tracking system to coordinate burner activity throughout the year.

The Airshed Group utilizes the services of a program manager (Monitoring Unit) and a meteorologist. Burners access a computerized database over the internet and enter parameters regarding their planned burning. During the spring burning season (March 1 through May 31), the meteorologist provides a dispersion forecast for members only. Prior to ignition, burners enter the appropriate data for a burn and check the dispersion forecast for their airshed. The monitoring unit tracks all database and meteorological activity to ensure optimal conditions and make final recommendations regarding burning.

The Airshed Group does not generally support summer or winter burning and does not provide meteorological services during the summer or winter months. During the fall burning season, DEQ engages the services of the Airshed Group meteorologist and provides a dispersion forecast for members and non-members.

For information regarding the Airshed Group, see:

<http://www.smokemu.org/>

LOCAL PROGRAM & MINOR OPEN BURNING

In addition to the requirements described above, open burners must comply with local program burning restrictions, particularly when local determinations of burning conditions are more restrictive than state or Monitoring Unit (MU) determinations.

Minor open burners are generally characterized as either residential and / or small business. The amount of burning is typically low and is not often routine. Minor open burners are regulated through state open burning rules and are required to contact DEQ through the 1-800 hotline for burning restrictions in the fall. Minor open burners must comply with BACT year-round and observe local program restrictions.

3.6 Action 6: Conduct Additional BACM Determination and Implementation

If necessary to further reduce smoke from prescribed burning during a wildfire event, the Program may make additional BACM determinations that may be implemented during a wildfire event. Various management techniques can be applied to reduce the emissions produced from wildland burning. Emission reduction strategies include techniques to exclude fuels from burning or burning fuels in ways that will increase combustion efficiency. To truly reduce total emissions over time, fuels excluded from one incident (prescribed fire or wildland fire managed for resource benefits) must not merely be consumed by some future incident (wildland fire).

Appendix F outlines a list of additional BACM control measure techniques for prescribed burning. Most techniques can be categorized as either fuel reduction or fuel treatment techniques and are routinely implemented by the Program. Table 8 outlines additional BACM determination and implementation responsibilities.

TABLE 8

Additional BACM Determination and Implementation Responsibilities

ACTION¹	DEQ	DPHHS	OTHER AFFECTED PARTIES²
Require additional BACM activities as part of the Smoke Management Program	AP ³ AQPP ⁴	NA	NA

1 - Action sequence does not connote priority.

2 - Other affected parties may include, but is not limited to federal and local health agencies; federal, state, and local disaster and emergency relief agencies; state departments of Labor & Industry and Office of Public Instruction; U.S. Forest Service; National Park Service; Fish and Wildlife Service; Bureau of Land Management; private residential land owners; and private commercial land owners.

3 - Air Permitting Program (APP), DEQ.

3.7 Action 7: Conduct Emergency Episode Avoidance Plan Determination

If a wildfire event resulted in elevated PM concentrations and was anticipated to remain elevated, DEQ is required to determine whether the administrative requirements found in the Montana Emergency Episode Avoidance Plan are applicable.

4.0 DEQ ACTIONS FOR SUBMITTING FLAGGED MONITORING DATA

DEQ shall take specific actions before submitting monitoring data adjustments for a wildfire event. Wildfire events are defined as any individual wildfire, or collection of wildfires, that can be demonstrated to have a clear casual relationship between measured emissions and impacts on air quality, public health, and/or visibility. DEQ shall document each wildfire event as set forth below.

4.1 Action 1: Documenting the Occurrence of Each Wildfire Event

DEQ shall document the occurrence of wildfire events by any of the following methods when available:

- (1) Compiling state and federal agency reports.
- (2) Gathering monitoring data.
- (3) Gathering relevant news reports.
- (4) Gathering meteorological data.
- (5) Gathering satellite photos.

The Exceptional Events Rule requires states that flag data to satisfy the requirements of 40 CFR 50.14 (c)(3)(iii) to provide evidence that: (a) the event satisfies the criteria that it was not reasonably controllable or preventable; (b) there is a clear casual relationship between the measured value and the event; (c) the event is associated with a measured value in excess of historical values; and (d) there would have been no exceedances or violation but for the event.

4.2 Action 2: Flagging AIRS Data

According to the Exceptional Events Rule, DEQ should flag particulate (PM-10 and/or PM-2.5) monitoring values affected by a wildfire event into the EPA AQS database and submit to EPA not later than July 1st of the calendar year following the year in which the flagged measurement occurred. 40 CFR 50.14 (c)(2)(iii).

4.3 Action 3: Documentation Submission to EPA

According to the Exceptional Events Rule, DEQ a state that has flagged data must submit a demonstration to justify data exclusion to EPA not later than the lesser of, three years following the end of the calendar quarter in which the flagged concentration was recorded or, 12 months prior to the date that a regulatory decision must be made by EPA. 40 CFR 50.14 (c)(3)(i).

4.4 Action 4: Public Participation

DEQ shall notice and provide for public comment all monitoring data submitted for exclusion. DEQ shall notify the public of changes to this Plan and of the documentation package for flagged data. Copies of this Plan and the documentation shall be made available for public review by the designated repositories and the DEQ website. DEQ shall also notify interested parties of the request for adjustment and the availability of the documentation for review. Proof of public participation for this Plan and the documentation package will be contained in a 'Record of Public Hearing'.

5.0 RE-EVALUATE PLAN EVERY FIVE YEARS

DEQ is required to re-evaluate the Plan every five years. This re-evaluation shall assess the natural events leading to any requests for adjustments of monitoring values, the status of the implementation of the Plan, and the adequacy of the actions set forth in the Plan. Table 9 outlines the Plan reevaluation responsibilities.

TABLE 9
Responsibilities for Re-Evaluating Plan Every Five Years

ACTION¹	DEQ	DPHHS	OTHER AFFECTED PARTIES²
Assess wildfire events	AQPP ³	As Needed	As Needed
Assess current status of the Plan	AQPP	As Needed	As Needed

Assess adequacy of the Plan	AQPP	As Needed	As Needed
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- 1 - Action sequence does not connote priority.
- 2 - Other affected parties may include, but is not limited to federal and local health agencies; federal, state, and local disaster and emergency relief agencies; state departments of Labor & Industry and Office of Public Instruction; U.S. Forest Service; National Park Service; Fish and Wildlife Service; Bureau of Land Management; private residential land owners; and private commercial land owners.
- 3 - Air Quality Policy & Planning (AQPP), DEQ.

6.0 REFERENCES

- (1) U.S. Department of Agriculture, Southern Forest Fire Laboratory, Southeastern Forest Experiment Station, Macon, Georgia. Contents and Effects of Forest Fire Smoke (reprint). Charles Tangren et. al. authors. N.d.
- (2) U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Prescribed Burning Background Document and Technical Information Document for Prescribed Burning Best Available Control Measures. (1992 - Research Triangle Park, NC: EPA-450/2-92-003).

7.0 APPENDICES

The following appendices contain information in support of the Plan. They also contain documentation for the Plan's public participation process and documentation for each wildfire event including its public participation process. The public participation process will follow the requirements outlined in 40 CFR Part 51 Appendix V.

APPENDIX A. EPA Exceptional Events Rule

PART 50 — NATIONAL PRIMARY AND SECONDARY AMBIENT AIR QUALITY STANDARDS

1. The authority citation for part 50 continues to read as follows: Authority: 42 U.S.C. 7401 *et seq.*

2. Amend § 50.1 to add paragraphs (j) and (k) to read as follows: § 50.1 Definitions.

(j) *Exceptional event* means an event that affects air quality, is not reasonably controllable or preventable, is an event caused by human activity that is unlikely to recur at a particular location or a natural event, and is determined by the Administrator in accordance with 40CFR 50.14 to be an exceptional event. It does not include stagnation of air masses or meteorological inversions, a meteorological event involving high temperatures or lack of precipitation, or air pollution relating to source noncompliance.

(k) *Natural event* means an event in which human activity plays little or no direct causal role.

(l) *Exceedance with respect to a national ambient air quality standard* means one occurrence of a measured or modeled concentration that exceeds the specified concentration level of such standard for the averaging period specified by the standard.

3. Add § 50.14 to read as follows:

§ 50.14 Treatment of air quality monitoring data influenced by exceptional events.

(a) *Requirements.* (1) A State may request EPA to exclude data showing exceedances or violations of the national ambient air quality standard that are directly due to an exceptional event from use in determinations by demonstrating to EPA's satisfaction that such event caused a specific air pollution concentration at a particular air quality monitoring location. (2) Demonstration to justify data exclusion may include any reliable and accurate data, but must demonstrate a clear causal relationship between the measured exceedance or violation of such standard and the event in accordance with paragraph (c)(3)(iii) of this section.

(b) *Determinations by EPA.* (1) EPA shall exclude data from use in determinations of exceedances and NAAQS violations where a state demonstrates to EPA's satisfaction that an exceptional event caused a specific air pollution concentration in excess of one or more national ambient air quality standards at a particular air quality monitoring location and otherwise satisfies the requirements of this section. (2) EPA shall exclude data from use in determinations of exceedances and NAAQS violations where a State demonstrates to EPA's satisfaction that emissions from fireworks displays caused a specific air pollution concentration in excess of one or more national ambient air quality standards at a particular air quality monitoring location and otherwise satisfies the requirements of this section. Such data will be treated in the same manner as

exceptional events under this rule, provided a State demonstrates that such use of fireworks is significantly integral to traditional national, ethnic, or other cultural events including, but not limited to July Fourth celebrations which satisfy the requirements of this section.(3) EPA shall exclude data from use in determinations of exceedances and NAAQS violations, where a State demonstrates to EPA's satisfaction that emissions from prescribed fires caused a specific air pollution concentration in excess of one or more national ambient air quality standards at a particular air quality monitoring location and otherwise satisfies the requirements of this section provided that such emissions are from prescribed fires that EPA determines meets the definition in § 50.1(j), and provided that the State has certified to EPA that it has adopted and is implementing a Smoke Management Program or the State has ensured that the burner employed basic smoke management practices. If an exceptional event occurs using the basic smoke management practices approach, the State must undertake a review of its approach to ensure public health is being protected and must include consideration of development of a SMP.

(4) [Reserved]

(c) *Schedules and Procedures.* (1) Public notification.(i) All States and, where applicable, their political subdivisions must notify the public promptly whenever an event occurs or is reasonably anticipated to occur which may result in the exceedance of an applicable air quality standard.(ii) [Reserved.](2) Flagging of data.(i) A State shall notify EPA of its intent to exclude one or more measured exceedances of an applicable ambient air quality standard as being due to an exceptional event by placing a flag in the appropriate field for the data record of concern in accordance with the schedules for submission of data to the AQS database in 40 CFR 58.16.(ii) Flags placed on data in accordance with this section shall be deemed informational only, and the data shall not be excluded from determinations with respect to exceedances or violations of the national ambient air quality standards unless and until, following the State's submittal of its demonstration pursuant to paragraph(c)(3) of this section and EPA review, EPA notifies the State of its concurrence by placing a concurrence flag in the appropriate field for the data record in the AQS database.(iii) Flags placed on data as being due to an exceptional event together with an initial description of the event shall be submitted to EPA not later than July 1st of the calendar year following the year in which the flagged measurement occurred, except as allowed under paragraph (c)(2)(iv) of this section.(iv) For PM_{2.5} data collected during calendar years 2004–2006, that the State identifies as resulting from an exceptional event, the State must notify EPA of the flag and submit an initial description of the event no later than October 1, 2007. EPA may grant an extension, if a State requests an extension, and permit the State to submit the notification of the flag and initial description by no later than December 1, 2007.(v) When EPA sets a NAAQS for a new pollutant, or revises the NAAQS for an existing pollutant, it may revise or set a new schedule for flagging data for the initial designation of areas for those NAAQS.(3) *Submission of demonstrations.*(i) A State that has flagged data as being due to an exceptional event and is requesting exclusion of the affected measurement data shall, after notice and opportunity for public comment, submit a demonstration to justify data exclusion to EPA not later than the lesser of, 3 years

following the end of the calendar quarter in which the flagged concentration was recorded or, 12 months prior to the date that a regulatory decision must be made by EPA. A State must submit the public comments it received along with its demonstration to EPA. (ii) A State that flags data collected during calendar years 2004–2006, pursuant to paragraph (c)(2)(iv) of this section, must adopt the procedures and requirements specified in paragraph (c)(3)(i) of this section and must include a demonstration to justify the exclusion of the data not later than the submittal of the Governor's recommendation letter on nonattainment areas. (iii) The demonstration to justify data exclusion shall provide evidence that: (A) The event satisfies the criteria set forth in 40 CFR 50.1(j); (B) There is a clear causal relationship between the measurement under consideration and the event that is claimed to have affected the air quality in the area; (C) The event is associated with a measured concentration in excess of normal historical fluctuations, including background; and (D) There would have been no exceedance or violation but for the event. (iv) With the submission of the demonstration, the State must document that the public comment process was followed.

(v) [Reserved.]

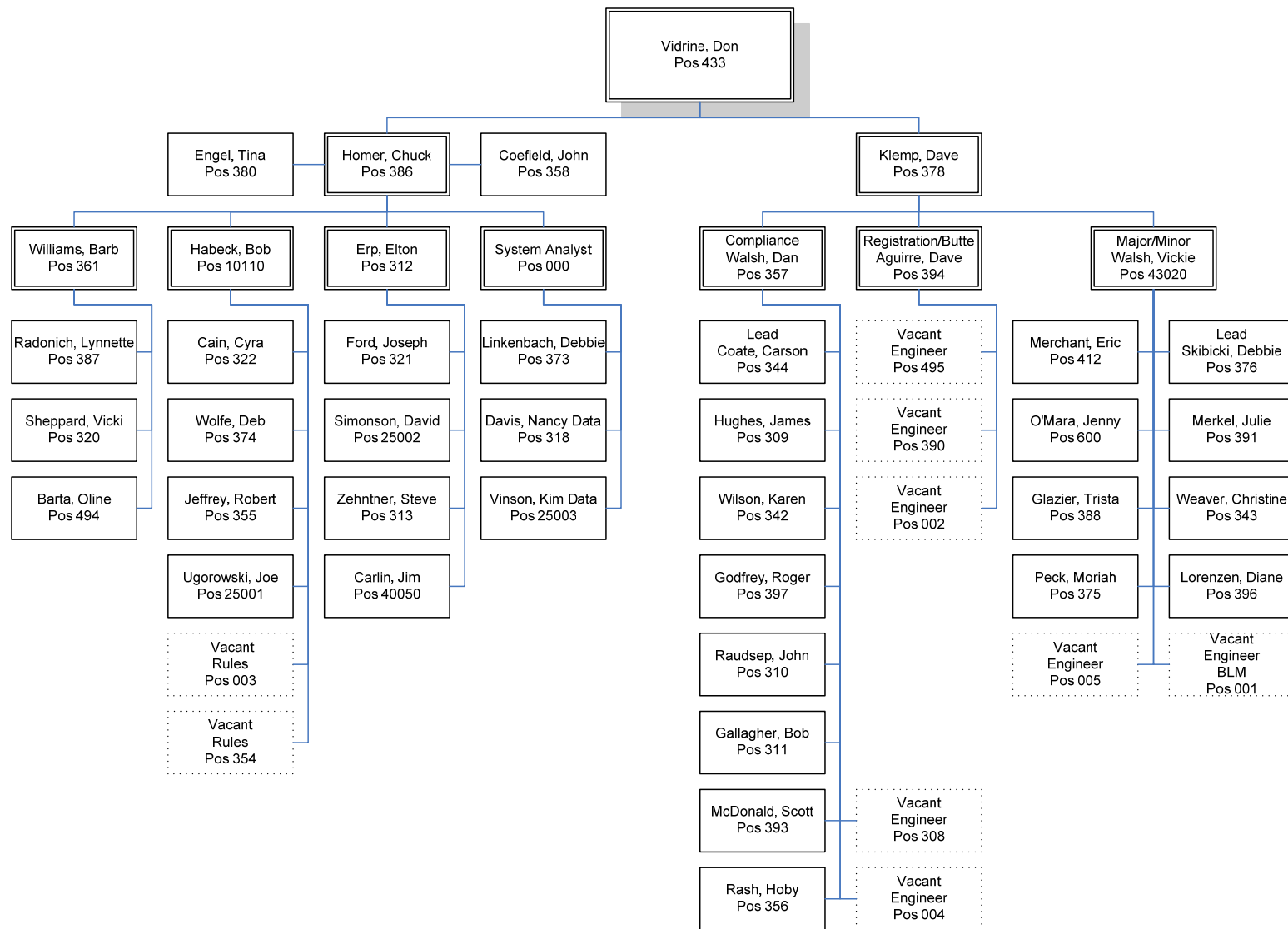
(A) [Reserved]

PART 51 — NATIONAL PRIMARY AND SECONDARY NATIONAL AMBIENT AIR QUALITY STANDARDS

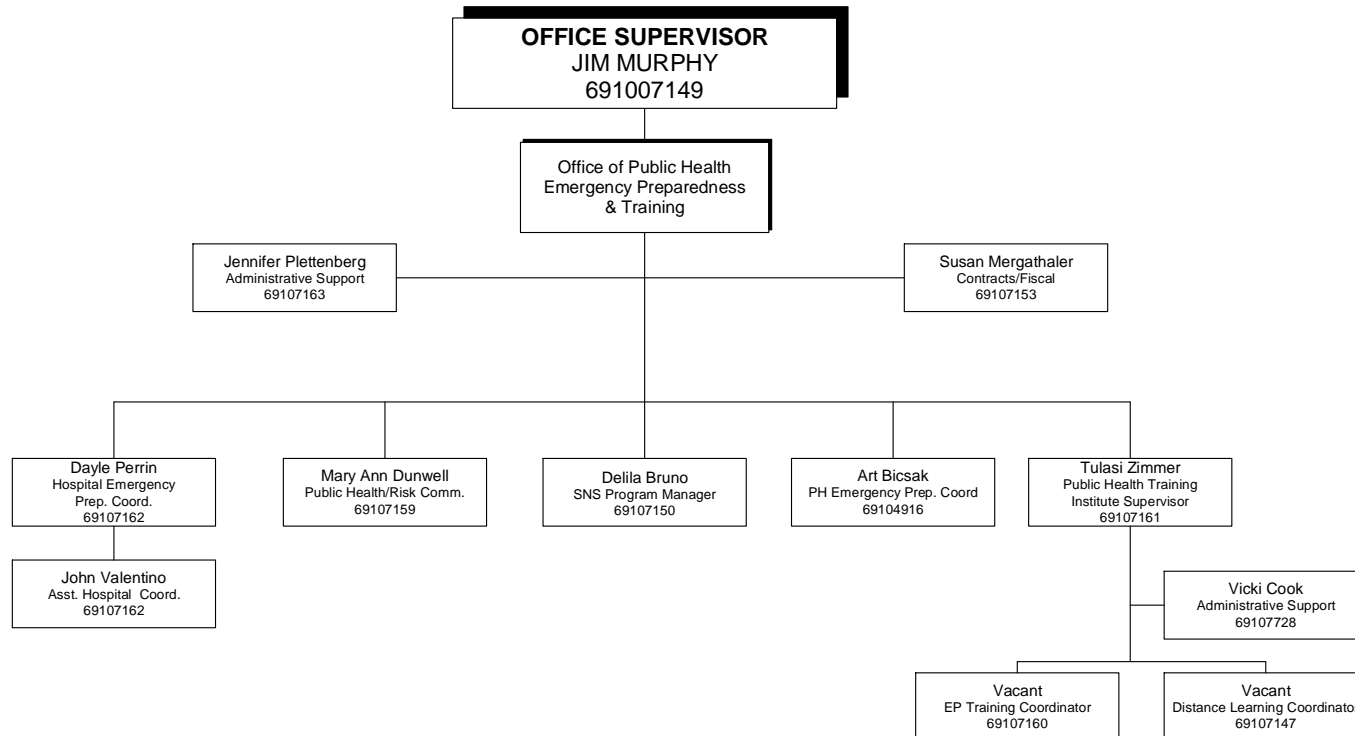
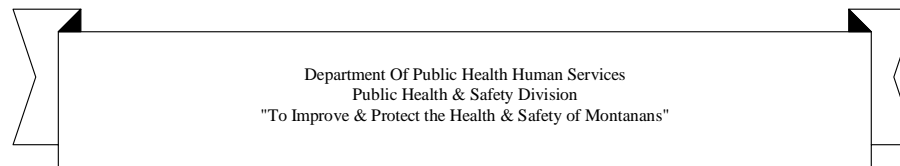
4. The authority citation for part 51 continues to read as follows: Authority: 23 U.S.C. 101; 42 U.S.C. 7401–7671q. 5. Adding Subpart Y consisting of § 51.930 to read as follows:

Subpart Y—Mitigation Requirements § 51.930 Mitigation of Exceptional Events. (a) A State requesting to exclude air quality data due to exceptional events must take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards. At a minimum, the State must: (1) Provide for prompt public notification whenever air quality concentrations exceed or are expected to exceed an applicable ambient air quality standard; (2) Provide for public education concerning actions that individuals may take to reduce exposures to unhealthy levels of air quality during and following an exceptional event; and (3) Provide for the implementation of appropriate measures to protect public health from exceedances or violations of ambient air quality standards caused by exceptional events. (b) [Reserved] [FR Doc. E7–5156 Filed 3–21–07; 8:45 am]

APPENDIX B. DEQ and DPHHS Bureau Organization Charts



MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY AIR RESOURCES MANAGEMENT BUREAU



updated 5/4/07

MONTANA DEPARTMENT OF PUBLIC HEALTH AND HUMAN SERVICES PUBLIC HEALTH & SERVICES BUREAU

APPENDIX C. DEQ and DPHHS Memorandum of Understanding

**MEMORANDUM OF UNDERSTANDING
BETWEEN
THE MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
AND
THE MONTANA DEPARTMENT OF
PUBLIC HEALTH AND HUMAN SERVICES**

- I. Purpose:** This Memorandum of Understanding (MOU) defines the responsibilities and procedures under which the Montana Department of Environmental Quality (DEQ) and the Montana Department of Public Health and Human Services (DPHHS) will interact to protect and enhance public health and environmental quality (environmental health) for the benefit of all Montana citizens. DEQ and DPHHS recognize it is important to establish and maintain effective services to citizens of the State of Montana. This MOU, therefore, is established with the intent to promote the cooperation, coordination and performance of the functions of these two administrative agencies.
- II. Authority:** Chapters 418 and 546 of the laws of the 1995 Legislature implemented recommendations of the Governor's Task Force to Renew Government by transferring all programs administered by the Department of Health and Environmental Sciences into a new DEQ and a new DPHHS. This MOU is established by mutual agreement of the DEQ and DPHHS.
- III. Scope:** This MOU initiates and defines the procedures DEQ and DPHHS will follow in:
- a. Establishing four (4) meetings a year for agency representatives identified by the directors to discuss environmental health issues;
 - b. Carrying out individual and collective responsibilities in emergency situations;
 - c. Conducting routine mandated responsibilities;
 - d. Coordinating inspections and enforcement actions; and
 - e. Providing education, training and public information.
- IV. Responsibilities:**
- A. Quarterly Meetings:** The four (4) meetings a year will provide an opportunity for both agencies to discuss environmental health issues, regulatory matters and cooperative administrative policies.
1. DEQ and DPHHS agree to establish a meeting schedule on a quarterly basis for the duration of this MOU.
 2. The meetings will be held in Helena on the 15th day of the 1st month in each quarter of the calendar year. DEQ and DPHHS will alternate hosting the meetings. The meetings will begin at 10:00 a.m. and last as long as it takes to sufficiently complete the agenda. Meeting dates, times and locations can be changed with the mutual consent of the agencies.

3. Each agency director will appoint a coordinator to act as the official department liaison for this MOU. The coordinator will be responsible for preparing the agenda when his or her agency hosts the meeting.
4. In addition to the appointed coordinators, DEQ and DPHHS directors will select the appropriate agency representatives to represent their agency, along with any other representatives the directors might feel would be appropriate.
5. The host agency will be responsible for recording, preparing and distributing the minutes of the meeting.
6. The directors or their designees will attend all meetings and will ensure the participation of program managers and any other appropriate department personnel.

B. Emergency Situations: Natural and technological disasters require close cooperation between DEQ and DPHHS and with other state, local and federal agencies.

1. DEQ and DPHHS coordinators will be responsible for interagency coordination.
2. The coordinators or appropriate designees will represent their agency at state agency situation briefings. They will be responsible for presenting their agency's involvement and, in instances where DEQ and DPHHS are working jointly, be prepared to present the status of those situations.
3. If the emergency situation warrants a substantial involvement and commitment of resources by DEQ and DPHHS, the agency coordinators can agree to meet jointly as often and long as they believe necessary. They will be responsible for arranging the meetings and identifying and notifying the appropriate DEQ and DPHHS personnel.

C. Routine Mandated Responsibilities: DEQ and DPHHS routinely administer environmental health laws, which are the basis for their mandated responsibilities. Successful formal and informal working relationships have been formed by many of these programs.

1. Environmental health programs in DEQ and DPHHS which successfully fulfill their separate and collective responsibilities should continue to do so.
2. DEQ and DPHHS program personnel are encouraged to solve common problems.
3. In instances where a problem(s) cannot be solved by program personnel, the situation(s) can be discussed and resolved at the quarterly meetings.

The ultimate arbiters for interagency disagreements will be the directors of the two agencies.

4. DEQ and DPHHS programs that are concerned with environmental health interests include:

DEQ:

Permitting and Compliance:

- a. Water Quality Permitting - Surface Water and Ground Water
- b. Air Quality Permitting
- c. Drinking Water
- d. Subdivisions
- e. Motor Vehicle Recycling and Disposal
- f. Solid Waste Management
- g. Hazardous Waste Management
- h. Asbestos Control
- i. Underground Storage Tanks
- j. Methamphetamine Cleanup

Planning, Prevention and Assistance:

- a. Ambient Air Monitoring
- b. Municipal Wastewater
- c. Radiation Control
- d. Occupational Health

Remediation:

- a. Federal Superfund (CERCLA)
- b. State Superfund (CECRA)
- c. Leaking Underground Storage Tanks

DPHHS:

Epidemiologic Investigations

Communicable Diseases

Cancer Clusters

Health Effect Studies

Chemistry Laboratory

Microbiology Laboratory

Water Fluoridation

Prevention of Lead Poisoning in Children

Emergency Medical Services

Food and Consumer Safety

- a. Food, Drug and Cosmetics
- b. Food Establishments
- c. Daycare Centers, Schools and Institutions
- d. Vector Control
- e. Trailer Courts and Campgrounds
- f. Work Camps, Youth Camps, Spas, Swimming Pools and Bathing

Areas

- g. Consumer Product Safety
- h. Environmental Public Health Investigations

- i. Public accommodations, including Hotels, Motels, Bed & Breakfasts, Guest Ranches, etc.
- j. Tattoo and body piercing establishments.

D. Inspections and Enforcement: State law requires food service establishments, drinking establishments, daycare centers, public accommodations, food processors, and other public establishments to be licensed by DPHHS. DPHHS regulations require these establishments to have approved water supplies, wastewater treatment systems, and solid waste disposal. State law requires DEQ to enforce the requirements of the state's Public Water Supply Act, Water Quality Act, and Solid Waste Management Act. To ensure that timely and appropriate enforcement actions are taken against persons who own and/or operate licensed establishments that are in violation of the state's safe drinking water, wastewater treatment, and solid waste management regulations, DEQ and DPHHS agree to take the following action to support enforcement actions taken by either agency.

1. Inspections established under statutory authorities for DEQ and DPHHS shall continue.
2. DEQ and DPHHS programs are encouraged to periodically evaluate their inspection requirements and improve interagency cooperation where possible.
3. DEQ and DPHHS agree to share information about violations at facilities regulated by both agencies.
 - a. DEQ and DPHHS agree to share lists of regulated facilities.
 - b. DEQ and DPHHS agree to share inspection results and other information for use in enforcement proceedings taken by either agency. As necessary, each agency will provide the other with documentation of violations discovered at a facility that is regulated by the other agency.
 - c. Personnel from the two agencies will provide evidence, including testimony, for DEQ and DPHHS proceedings if appropriate.
4. DEQ and DPHHS agree to cooperate as appropriate in informal enforcement activities and in providing compliance assistance to facilities regulated by both agencies.
 - a. DEQ shall provide DPHHS copies of Warning Letters, Violation Letters, Notices of Violation and Orders sent to facilities licensed by DPHHS.
 - b. DPHHS shall provide DEQ with copies of Plans of Corrections and Notices of Violations sent to facilities regulated by DEQ.
 - c. DEQ and DPHHS shall cooperate as appropriate in the development of corrective actions required in Violation Letters or Plans of Correction.
5. *DEQ and DPHHS agree to cooperate as appropriate in formal enforcement actions initiated by either agency against a facility regulated by both agencies.*

- a. When either agency is anticipating an enforcement action involving an establishment or facility licensed by DPHHS, DEQ and DPHHS agree to investigate the violations in the context of the agencies' authority and responsibilities and take appropriate enforcement actions to support the enforcement proceedings taken by either agency.
- b. DEQ agrees to take appropriate enforcement actions against owners and/or operators of licensed establishments and facilities for violations of the state's public water supply, water quality, or solid waste management laws and regulations that have been identified and for which compliance has not been attained.
- c. DPHHS agrees to take appropriate enforcement actions, which may include the denial, suspension, or revocation of licensed establishments that are involved in enforcement proceedings initiated by DEQ for violations of the state's public water supply, water quality, or solid waste management laws and regulations.
- d. DEQ and DPHHS agree to take joint enforcement actions as appropriate. Joint enforcement may include coordinated proceedings conducted concurrently and/or an individual enforcement action signed by both departments.

E. Education, Training and Public Information

- 1. Education: DEQ and DPHHS program personnel will continue environmental health educational efforts and will work cooperatively whenever possible.**
- 2. Training: Both agencies should keep in mind the advantages of sharing training opportunities and create a means for notifying personnel of upcoming opportunities.**
- 3. Public Information:**
 - a. DEQ and DPHHS information officers will attend the quarterly meetings.
 - b. The information officers will coordinate efforts to advise and assist DEQ and DPHHS program personnel in preparing information for the news media.

V. MOU Review: This MOU will remain in effect unless the parties mutually agree to modification or termination.

Dated this 15th day of November, 2005.

[Signed]

Richard H. Opper
Director
Department of Environmental Quality

[Signed]

Joan Miles
Director
Department of Public Health and Human Services

APPENDIX D. Example Public Education / Outreach Information

PUBLIC SERVICE ANNOUNCEMENT

PEOPLE IN < INSERT NAME OF AREA > SHOULD STAY TUNED TO AIR QUALITY REPORTS FOR SMOKE INFORMATION

DATELINE – Residents living in the area of the < *INSERT NAME OF FIRE*> fire should listen to local air quality forecasts to help them plan their daily activities.

Wildfire smoke can pose a particular risk for people with heart and lung disease, as well as for children and the elderly. At high enough levels, even healthy people can experience problems.

One of the biggest dangers of smoke come from particulate matter – solid particles and liquid droplets found in the air. The particles in smoke often are tiny – nearly 1/30th the diameter of the average human hair.

These particles can build up in the respiratory system, causing burning eyes, runny noses and illnesses such as bronchitis. These particles also can aggravate heart and lung disease, such as congestive heart failure, chronic obstructive pulmonary disease, emphysema and asthma.

Check you local air quality forecasts to help you plan your activities. Many communities report the Environmental Protection Agency's Air Quality Index, or AQI. As smoke gets worse, the index for particles changes. And so do the guidelines for protecting yourself.

If your area doesn't monitor particle levels, use common sense to protect your health. When it's smoky outside, keep your children indoors. Instead of going for a run, go to the gym, or work out at home. If you have asthma, make sure you take your medications. And when smoke reaches hazardous levels, everyone should stay inside.

If you begin experiencing symptoms, such as coughing, burning eyes or a runny nose, contact your doctor or your county health department – especially if you have heart or lung disease.

For more information about smoke from the < *NAME OF FIRE HERE* >, call < *INSERT CONTACT OR WEB INFORMATION HERE* >

For information on the AQI, go to <http://www.epa.gov/airnow/aqibroch/>

#####

PUBLIC SERVICE ANNOUNCEMENT

WILDFIRE SMOKE CAN AFFECT YOU EVEN INDOORS

DATELINE – When smoke levels from wildfires stay high for a long period, smoke can affect you even indoors.

The tiny particles in wildfire smoke can easily get inside your home. Over time, the particles can build up and can cause you problems – especially if you have a heart disease, such as congestive heart disease, or lung diseases such as chronic obstructive pulmonary disease, emphysema or asthma. The elderly and children also are more susceptible to the effects of smoke.

If you are advised to stay indoors, there are a number of steps you can take to keep the air inside your home as smoke-free as possible:

- Keep your windows and doors closed.
- Run your air conditioner, if you have one. Be sure to keep the fresh air intake closed and the filter clean.
- Use an indoor air filtration device with a HEPA filter. Make sure to change the filter regularly. Do not use air cleaners that work by generating ozone: They put more pollution inside your home.
- Avoid using anything that burns, including wood stoves and gas stoves, if possible, and even candles.
- Don't smoke. That just puts more pollution in your lungs – and those of the people around you.

If you have symptoms of smoke exposure indoors (coughing, stinging and watering eyes, runny nose, etc.) call your doctor or your county health department. This is particularly important for people with heart or respiratory diseases, the elderly and children.

For more information on particles and health, go to <http://www.epa.gov/airnow/aqibroch/>

For information on local air quality, call <INSERT NUMBER OF LOCAL AIR AGENCY, HEALTH DEPARTMENT OR OTHER AGENCY REPORTING AIR QUALITY>

#####

Wildfire Smoke and Your Health

What's in smoke from a wildfire?

Smoke is made up small particles, gases and water vapor. Water vapor makes up the majority of smoke. The remainder includes carbon monoxide, carbon dioxide, nitrogen oxide, irritant volatile organic compounds, air toxics and very small particles.

Is smoke bad for me?

Yes. It's a good idea to avoid breathing smoke if you can help it. If you are healthy, you usually are not at a major risk from smoke. But there are people who are at risk, including people with heart or lung diseases, such as congestive heart disease, chronic obstructive pulmonary disease, emphysema or asthma. Children and the elderly also are more susceptible to smoke.

What can I do to protect myself?

- Many areas report EPA's Air Quality Index for *particulate matter*, or *PM*. PM (tiny particles) is one of the biggest dangers from smoke. As smoke gets worse, that index changes -- and so do guidelines for protecting yourself. So listen to your local air quality reports.
- Use common sense. If it looks smoky outside, that's probably not a good time to go for a run. And it's probably a good time for your children to remain indoors.
- If you're advised to stay indoors, keep your windows and doors closed. Run your air conditioner, if you have one. Keep the fresh air intake closed and the filter clean.
- Help keep particle levels inside lower by avoiding using anything that burns, such as wood stoves and gas stoves – even candles. And don't smoke. That puts even more pollution in your lungs – and those of the people around you.
- If you have asthma, be vigilant about taking your medicines, as prescribed by your doctor. If you're supposed to measure your peak flows, make sure you do so. Call your doctor if your symptoms worsen.

How can I tell when smoke levels are dangerous? I don't live near a monitor.

Generally, the worse the visibility, the worse the smoke. In Montana, the Department of Environmental Quality uses visibility to help you gauge wildfire smoke levels. For a guide, go to www.deq.state.mt.us/fireupdates/ and click on the link labeled "Forest Fire Smoke Categories." Links to daily air quality updates are on the same page.

How do I know if I'm being affected?

You may have a scratchy throat, cough, irritated sinuses, headaches, runny nose and stinging eyes. Children and people with lung diseases such as asthma may find it difficult to breathe as deeply or vigorously as normally, and they may cough or feel short of breath. People with diseases such as asthma or chronic bronchitis may find their symptoms worsening.

Should I leave my home because of smoke?

The tiny particles in smoke do get inside your home. If smoke levels are high for a prolonged period of time, these particles can build up indoors. If you have symptoms indoors (coughing, burning eyes, runny nose, etc.), talk with your doctor or call your county health department. This is particularly important for people with heart or respiratory diseases, the elderly and children.

Are the effects of smoke permanent?

Healthy adults generally find that their symptoms (runny noses, coughing, etc.) disappear after the smoke is gone.

Do air filters help?

They do. Indoor air filtration devices with HEPA filters can reduce the levels of particles indoors. Make sure to change your HEPA filter regularly. Don't use an air cleaner that works by generating ozone. That puts more pollution in your home.

Do dust masks help?

Paper "comfort" or "nuisance" masks are designed to trap large dust particles -- not the tiny particles found in smoke. These masks generally will not protect your lungs from wildfire smoke.

How long is the smoke going to last?

That depends on a number of factors, including the number of fires in the area, fire behavior, weather and topography. Smoke also can travel long distances, so fires in other areas can affect smoke levels in your area.

I'm concerned about what the smoke is doing to my animals. What can I do?

The same particles that cause problems for people may cause some problems for animals. Don't force your animals to run or work in smoky conditions. Contact your veterinarian or county extension office for more information.

How does smoke harm my health?

One of the biggest dangers of smoke comes from *particulate matter* -- solid particles and liquid droplets found in air. In smoke, these particles often are very tiny, smaller than 2.5 micrometers in diameter. How small is that? Think of this: the diameter of the average human hair is about 30 times bigger.

These particles can build up in your respiratory system, causing a number of health problems, including burning eyes, runny noses and illnesses such as bronchitis. The particles also can aggravate heart and lung diseases, such as congestive heart failure, chronic obstructive pulmonary disease, emphysema and asthma.

Where is the smoke coming from?

It depends on where you are. To find out about smoke in your area, check with your local smoke management unit or health department. In Montana and Idaho, call 406-329-4905. On the Internet, go to: <http://www.inciweb.org/state/27/>

What about firefighters?

Firefighters do experience short-term effects of smoke, such as stinging, watery eyes, coughing and runny noses. Firefighters must be in good physical condition, which helps to offset adverse effects of smoke. In addition to being affected by particles, firefighters can be affected by carbon monoxide from smoke. A recent Forest Service study showed a very small percentage of firefighters working on wildfires were exposed to levels higher than occupational safety limits for carbon monoxide and irritants. If you are working on a fire and you're concerned about your health, see the medical unit or contact your safety officer. If you're not working on a fire, call your doctor.

Why can't the firefighters do something about the smoke?

Firefighters first priorities in fighting a fire are, by necessity, protecting lives, protecting homes and containing the wildfire. Sometimes the conditions that are good for keeping the air clear of smoke can be bad for containing fires. A windy day, for example, helps smoke disperse. But it can help a fire spread.

Firefighters do try to manage smoke when possible. As they develop their strategies for fighting a fire, firefighters consider fire behavior and weather forecasts, topography and proximity to communities – all factors that can affect smoke.

Why doesn't it seem to be as smoky when firefighters are working on prescribed fires.

Land managers are able to plan for prescribed fires. They get to choose the areas they want to burn, the size of those areas and the weather and wind conditions that must exist before they begin burning. This allows them to control the fire more easily and limit its size. Those choices don't exist with wildfires. In addition, wildfires that start in areas that haven't been managed with prescribed fire often have more fuel, because vegetation in the forest understory has built up, and dead vegetation has not been removed.

How do you measure the quality of the air?

Local air agencies (or sometimes federal land managers) use monitors to measure the amount of particulates in the air. That amount, measured in micrograms per cubic meter, is compared to a national index designed to protect public health.

Will the smoke be this bad every summer?

That depends on where you live and the weather each year. If you live in an area where fire has always been part of the ecosystem, you can expect fire and smoke. The amounts will depend on weather and the amount of fuel (trees, brush, etc.) available to be burned. You can protect yourself and your property by following good fire prevention measures. But we never will eliminate fire and smoke from these natural systems.



This document was prepared by the Air Program, U.S. Forest Service – Northern Region, with assistance from the Office of Air Quality Planning & Standards in the US Environmental Protection Agency. For more information, call 406-329-3493. August 2000.

TIPS TO REDUCE SMOKE EXPOSURE AND IMPACTS

For the Firefighter

Firefighters do experience short-term effects of smoke, such as stinging, watery eyes, coughing and runny noses. Firefighters must be in good physical condition which helps to offset adverse effects from smoke.

Previous studies have showed a small percentage of firefighters exceed occupational exposure limits for carbon monoxide and respiratory irritants. However, this is not a typical fire season. It is always a good practice to follow some basic tips to reduce the health stress that smoke exposure causes firefighters.

To Minimize Exposure to Smoke:

- Locate camps and incident command posts in areas that are not prone to inversions.
- Reduce dust by watering roads at the incident, on drier roads leading to the incident, and in the base camp.
- Rotate personnel out of heavy smoke areas.

Additional commonly used tactics to minimize exposure to smoke:

- Use flank attack as opposed to head attack, where appropriate, in heavy smoke situations.
- Minimize mop-up when possible.
- Use time and patience instead of water to put the fire out: use burn piles, allow areas to burn themselves out. Rely on burn-up instead of mop-up.
- In heavy smoke situations, remove crews from the line when possible.

Health Maintenance to Reduce Smoke Exposure Impacts:

- Monitor personnel for signs of fatigue and illness.
- Ensure firefighters are properly equipped for anticipated conditions (cold nights, rain, etc.).
- Provide for good rest and sleeping conditions.
- Encourage a high fluid intake during and after work for all personnel.
- Provide for adequate nutrition and supplements (e.g. antioxidants) if needed.

- Allow sick firefighters time to recover.
- Provide washing facilities near food lines and toilets.
- Limit close contact among firefighters by providing personal sleeping tents.
- Discourage sharing of canteens except in emergencies
- Encourage personnel to cover their mouth and nose when they cough or sneeze to avoid the spread of infection.
- Segregate infected personnel when possible
- Demobilize crews that have a large number of sick personnel.
- When symptoms are above the neck (stuffy nose, sneezing, scratchy throat), it is safe to continue to work if personnel continue to practice health maintenance tips mentioned above. If symptoms include fever, aching muscles, nausea, or diarrhea, hard work should be reduced or curtailed.
- When symptoms are respiratory in nature (lung congestion, expelling of phlegm, chronic cough) it may be appropriate to reduce or curtail hard work. If symptoms persist and become severe, the medical unit leader should consult a qualified physician to determine the appropriate treatment that may include a rest period in a clean air environment. This clean air environment could include a nearby motel or fire camp that is smoke free or a school auditorium with a closed, filtered circulation system.

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SMOKE IN THE AIR

Health Tips from the American Red Cross

Smoke consists of particles of various sizes. The large particles you see “floating” down are easy to escape by staying in a house or vehicle. However, the small particles that you cannot see as individual particles but as fog like, are the particles that cause the damage. Lung damage occurs not only in humans, but in animals as well. Particulate matter also causes more lung damage to infants and young children than adults.

Individuals with pre-existing respiratory/lung problems are at a greater risk for having breathing problems. People with asthma, emphysema, COPD, and allergies (like hay fever) should contact their health care provider as soon as possible for advice on how to handle an acute respiratory episode.

Coping:

- Stay indoors as much as possible. Wash or change filter(s) on air conditioners and/or furnaces frequently. You may be able to find special filters that will filter out smaller particles than a regular filter.
- Do not run or engage in heavy work or exercise when smoke is heavy.
- Wear a HEPA particulate respirator (mask) when in heavy smoke, especially out doors.
- If you do not have a way of filtering indoor air and there is smoke in your home, you could try an electric fan operated HEPA to remove particles.
- Stay well hydrated by drinking lots of water and fruit juices. Staying well hydrated helps dilute the phlegm in the respiratory tract making it easier to cough out smoke particles. Plan on coughing, it is nature’s way of clearing your lungs. Avoid caffeine products and alcohol as it has a dehydrating effect.
- If you have contact lenses – switch to eyeglasses when in a smoky environment. The low humidity in Montana reduces tearing to wash smoke particles out of eyes. Smoke irritated eyes can be moistened or flushed using saline drops or eye wash.
- Headaches will be common during a smoke emergency as they are caused by:
 - A. Dehydration.
 - B. Irritation of nose and sinus by smoke.
 - C. Forcefully blowing irritated nose resulting in mid-ear infection and earache.
 - D. Increased carbon monoxide in the air from large fires.

American Red Cross

Disaster Relief

If you need help, Call the Red Cross At:

Toll Free 1-800-541-2748

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY FOREST FIRE SMOKE CATEGORIES

Air Quality Index (AQI) for PM-2.5 24-Hour ¹

<u>Categories</u>	<u>Health Effects</u>	<u>Cautionary Statements</u>
Good	None	None
Moderate	Possibility of aggravation of heart or lung disease among persons with cardiopulmonary disease and the elderly.	None
Unhealthy for Sensitive Groups	Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly.	People with respiratory or heart disease, the elderly and children should limit prolonged exertion.
Unhealthy	Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in the general population.	People with respiratory or heart disease, the elderly, and children should avoid prolonged exertion; everyone else should limit prolonged exertion.
Very Unhealthy	Significant aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant risk of respiratory effects in the general population.	People with respiratory or heart disease, the elderly, and children should avoid any outdoor activity; everyone else should avoid prolonged exertion.
Hazardous	Serious aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; serious risk of respiratory effects in the general population.	Everyone should avoid any outdoor exertion; people with respiratory or heart disease, the elderly, and children should remain indoors.

¹

Guideline For Reporting Of Daily Air Quality – Air Quality Index (AQI), EPA-454/R-99-010, July 1999, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, 27711.

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

FOREST FIRE SMOKE CATEGORIES

Breakpoints and Associated Visibility for PM-2.5 Pollutant Standard Index (PSI) using TEOM PM10 values

<u>Categories</u>	<u>24-Hour TEOM (ug/m³)</u>¹	<u>8-Hour TEOM (ug/m³)</u>²	<u>1-Hour TEOM (ug/m³)</u>³	<u>Visibility (miles)</u>⁴
Good	0.0 - 13.4	0.0 - 19.1.0	0.0 - 33.5	≥ 13
Moderate	13.5 - 20.4	19.2 - 29.1	33.6 - 51.0	13 - 9
Unhealthy for Sensitive Groups	20.5 - 35.4	29.2 - 50.6	51.1 - 88.5.0	9 - 5
Unhealthy	35.5 - 80.4	50.7 - 114.9	88.6 - 201.0	5 - 2
Very Unhealthy	80.5 - 135.4	115.0 - 193.4	201.1 - 338.5	2 - 1
Hazardous	≥ 135.4	≥ 193.4	≥ 338.5	< 1

¹ Guideline For Reporting Of Daily Air Quality – Air Quality Index (AQI), EPA-454/R-99-010, July 1999, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, 27711.

² Applied U.S. EPA SCREEN adjustment factor for 8-hour, 0.7, multiplied to the 24-hour PM-2.5 Pollutant Standards Index.

³ Fire, Smoke and Health Workshop, Seattle, WA, June 5 - 6, 2001. USEPA, CDC, USFS, UW.

⁴ Based on Helena Montana empirical study (July 2000 Montana Dept. of Environmental Quality).

Montana Department of Environmental Quality

Visibility Ranges Used to Determine Forest Fire Smoke Categories

Over 13 miles	Good
13 to 9 miles	Moderate
9 to 5 miles	Unhealthy For Sensitive Groups
5 to 2 miles	Unhealthy
2 to 1 miles	Very Unhealthy
Less than 1 mile	Hazardous

The procedure for making personal observation to determine the forest fire smoke index value for local areas without National Weather Station (NWS) or DEQ monitors is:

1. Face away from the sun.
2. Determine the limit of your visible range by looking for targets at known distances (miles).
3. Visible range is that point at which even high contrast objects totally disappear.
4. Use the values above to determine the local forest fire smoke category.

APPENDIX E. Montana / Idaho State Airshed Group Information

Montana / Idaho State Airshed Group Information

The Montana / Idaho State Airshed Group Smoke Management Program (Program) was formed in 1978 order to minimize or prevent the accumulation of smoke from the major users of prescribed fire to such a degree that the state and federal air quality standards are preserved. The Program works to ensure that a proper balance exists between protecting the need for prescribed fire and the need to protect public health.

The Program is self-regulating and implemented through an agreement executed among members called the Smoke Management Plan. Program membership reduces burners' risk of violating state and federal air quality standards and may also reduce the number of public complaints concerning smoke. DEQ recognizes the Program as being the best available control technique for regulating smoke from prescribed fire. In Montana, DEQ has issued a blanket burning permit to all Program members allowing them to burn pursuant to guidelines set forth in the Program.

The state of Montana has been divided into ten airsheds. An additional fifteen airsheds represent north and south Idaho. Each airshed has its own coordinator who analyzes daily atmospheric conditions for burn restrictions during the opening burning season. This airshed management approach allows Program members more flexibility to burn at various locations and/or elevations than if they were to operate independently. This weather information service is only available to Program members.

Major open burners who are members of the Program apply for individual air quality permits each year from DEQ. Program members are required to follow the policies outlined in the Program Operation's Guide in addition to the provisions of the Montana Clean Air Act and the Administrative Rules of Montana (ARM). A major open burner is defined as any person, agency, institution, business, or industry conducting open burning that emits, per calendar year, more than 500 tons of carbon monoxide or 50 tons of any other pollutant except hydrocarbons regulated under ARM 17.8.601. Minor open burners, such as private citizens, are not members of the Program. However, minor open burners are required to call DEQ's toll free number to determine whether open burning is restricted.

The Program takes into consideration the effects of interstate transport of smoke and other particulate matter due to meteorology. The Program coordinator also recognizes areas of air quality sensitivity, or 'nonattainment' areas. Nonattainment areas are surrounded by 'impact zones' that are closely monitored to ensure that members do not violate state or federal air quality regulations. Winter burning from November to March is not allowed in impact zones.

The Program meets at least once per year to discuss and review the operation of the previous year's burning. This meeting also provides all members with the opportunity to make recommendations for the upcoming burn season and to fully participate in the function and operation of the Program.

APPENDIX F. Additional BACM Control Measure Information

BACM Control Measures

Perhaps the most obvious method to reduce wildland fire emissions is to reduce the amount of fuel burned. Reducing the amount of fuel burned should be accomplished by methods that result in reduced emissions: (a) at the time of the burn relative to normal practices, or (b) over longer time periods. Preferably, the emission reduction will not be simply deferred to a future date.

Alternatives to fire are least applicable when fire is needed for ecosystem or habitat management, or forest health enhancement. Alternative methods can be used to accomplish effects similar to what burning would accomplish when fire is used to eliminate an undesirable species or dispose of biomass waste. Examples of such techniques include specific fuel or chemical treatments and concentration burning (also called “swamper” or “jackpot” burning).

1.0 Minimizing Emissions by Fuel Reduction

Fuel treatments is a broad category that can include fuel loading reduction methods like mechanical removal of logging slash from clearcuts, use of animals to graze an area and reduce live vegetation and small twigs, and onsite chipping or crushing of woody material and/or brush. Mechanical removal of fuels for other purposes such as electrical power generation, firewood or consumer products made from wood that would otherwise be burned are examples of biomass utilization. Each method has drawbacks. Mechanical treatments, for example, may interfere with land management objectives if they cause undue soil disturbance or compaction, stimulate alien plant invasion, impair water quality, or remove material needed for nutrient cycling or small animal habitat. A difficulty with mechanical treatments is that most require good road access which is frequently not available in remote wildlands or costly helicopter removal.

Whole Tree Harvesting and/or Yarding of Unmerchantable Materials (YUM):

Mechanical removal of fuels may result in sufficient treatment so that burning is not needed. This technique is only applicable in activity fuels (debris generated from management activities; especially timber harvest). Since this technique is effective in reducing large woody fuels (those greater than 3 inches in diameter) it is applicable only in forest fuel types (not brush or grass).

Firewood Sales: Firewood sales may result in sufficient removal of woody debris making burning unnecessary. This technique is particularly effective for piled material where the public has easy access. This technique is only applicable in forest types with large diameter, woody biomass.

Mechanical Processing: Flailing or chipping of fuels using machinery to reduce or obviate the need to burn.

Biomass Utilization: Woody material can be used for many miscellaneous purposes including pulp for paper and specialty forest products (wood furniture or art). This category is difficult to define due to the potential diversity of uses. When wood is scarce

and pulp prices are high, biomass that previously had no commercial value could suddenly be marketable. Again this is only applicable in forest types that include large-diameter woody biomass.

Hog Fuel for Electrical Generation: Woody biomass can also be removed and used to provide electricity in regions with cogeneration facilities.

Ungulates: Grazing and browsing animals (especially sheep, cattle, and goats) can sometimes be used to reduce live grassy or brush fuels so burning is not longer required or to reduce fuels. However, ungulates are selective, favoring some plants over others. The cumulative effect of this selectivity can significantly change plant species composition and long-term ecological processes of an area.

Burn More Frequently: Frequent, low intensity fires can prevent unwanted vegetation from becoming established on the forest floor. If longer fire rotations are used, vegetation has time to grow resulting in the production of extra biomass and extra fuel loading at the time of burning. This technique generally has positive effects on land management goals since it is likely to result in fire regimes that more closely mimic natural fire frequencies.

Schedule Burning Before New Fuels Appear: Burning can sometimes be scheduled for times of the year before new fuels appear. This may interfere with land management goals if burning is forced into seasons and moisture conditions where increased mortality of desirable species can result or inadequate burn occurs.

Underburn Before Litter Fall: Brush vegetation or deciduous trees drop their leaves in the fall and this litter contributes extra volume to the ground fuels. If burning takes place prior to leaf fall, less available fuel exists and therefore less fuel is consumed, resulting in fewer emissions.

Burn Before Green-up: Burning in cover types with brush, herbaceous, or grassy fuel components can produce fewer emissions if burning takes place before green-up. Before green-up, less fuel is available for consumption and is often dry and efficiently consumed. Therefore, fewer emissions are produced unless fuel before green-up has an internal fuel moisture content so high that little fuel is consumed.

Isolating Fuels: Large logs, snags, deep pockets of duff, or other fuel concentrations that have the potential to smolder for long periods of time can be isolated by constructing a fireline around the fuels of concern. The fuels are scattered or sprayed with foam or other fire retardant material. Isolating these fuels from general burning is often faster, safer, and less costly than mop-up, allowing targeted fuels to remain following the prescribed burn.

Concentration (“Spot”) Burning: Sometimes a sub-area (specific ‘spots’) of fuels can be burned rather than using fire over 100 percent of an area. The total acres burned and emissions under these circumstances can be difficult to quantify.

Chemical Treatments. Chemicals may produce effects similar to fire when the objective is to reduce or remove live vegetation and/or species from a site. Chemical treatments carry their own set of ecological and public relations problems.

2.0 Minimizing Emissions by Reducing Fuel Consumption

Emission reduction can be achieved when significant amounts of fuel are at or above the moisture of extinction and therefore are unavailable for combustion, isolated from burning, or extinguished through mop-up. However, these techniques may leave significant amounts of fuel in the treated area that may be burned in the future. Long-term emission reductions are achieved only if the fuels left behind can be expected to decompose or be otherwise sequestered at the time of burning.

The ability to target and remove only the fuels necessary to meet management objectives is one of the most effective methods of reducing emissions from burning. When the combination of appropriate fuel type and burning conditions can be met, fuel consumption can be greatly reduced. For example, if the objective of burning is to reduce wildfire hazard, removal of fine and intermediate diameter fuels may be sufficient; and the ability to limit large fuel and organic layer consumption will significantly reduce emissions. Examples of this technique include burning when non-target fuel moistures are high, isolating non-target fuels, rapid (mass) ignition, and rapid mop-up.

High Moisture Content in Non-Target Fuels: Burning when internal moisture content of fuels is high effectively limits their consumption. Intuition might suggest that fuels with high moisture content will burn less efficiently and consequently produce more emissions. In reality, much less fuel is consumed when the fuel moisture content is high and emissions are greatly reduced as compared with burning under dry fuel moisture conditions.

High Moisture Content in Large, Woody Fuels: Burning when large-diameter woody fuels (3+ inches in diameter or greater) are wet can result in reduced fuel consumption and less smoldering. When large fuels are wet they will not sustain combustion on their own. When small twigs and branch-wood cease burning, large logs are extinguished by their own internal moisture. Large logs, therefore, are not completely consumed and do not smolder as much. Since the consumption of the large, woody fuels influences the consumption of the forest floor, reducing large woody fuel consumption also reduces consumption of the duff. This technique can be a very effective way of reducing total emissions from a prescribed burn area and can have secondary benefits by leaving more large-woody debris in place for nutrient cycling. This technique can be effective in natural and activity fuels in all forest types.

Moist Litter and/or Duff: The litter and organic layer that forms from decayed and partially decayed material generally burns very inefficiently and has the potential to create a tremendous amount of emissions. Consumption of this litter and/or duff layer can be greatly reduced if the material is quite moist. The surface fuels can be burned

and the organic layer left virtually intact. The appropriate conditions for utilization of this technique generally occur in the spring (in areas where snow has covered the ground over the winter) or within a few days of a soaking rain. This technique can be very effective at reducing emissions in certain cover types that tend to have deep organic layers. The technique may be more difficult to utilize in cover types where removal of the organic layer is desired.

Burn Before Large Fuels Cure: Living trees contain very high internal fuel moisture that takes a number of months to dry after harvest. If an area can be burned within 3-4 drying months of timber harvest, many of the large, woody logs will still contain a significant amount of live fuel moisture. This technique is generally restricted to activity-generated fuels in all forest habitats.

Mass Ignition / Shortened Fire Duration: Mass ignition can occur through a combination of dry fine-fuels and mechanical devices such as the helitorch to rapidly ignite large areas. Mass ignition can reduce the total amount of fuel consumed and shorten the duration of the smoldering phase of a fire by causing rapid consumption of dry, surface fuels and creating a very strong plume or convection column which draws much of the heat away from the fuel bed, preventing drying and preheating of the large, woody fuels and forest floor. This strong plume also results in improved smoke dispersal. The fire dies out shortly after the fine fuels are fully consumed and little smoldering or consumption of the larger fuels and duff occurs. The mass fire technique is most effective in open clearcut areas containing large, woody fuels and a relatively deep forest floor that have been timber-harvested.

Rapid Mop-up: Rapidly extinguishing a fire can reduce fuel consumption and smoldering emissions, although this technique is not particularly effective and can be very costly. Rapid mop-up primarily effects smoldering consumption of large, woody fuels and duff. Rapid mop-up reduces residual emissions that tend to get caught in drainage flows and enter smoke sensitive areas.

3.0 Minimizing Emissions by Fuel Treatments

Increasing combustion efficiency, or shifting the majority of consumption away from the smoldering phase and into the more efficient flaming phase, can reduce total emissions. Several lighting and fuel manipulation techniques that are available to managers for increasing combustion efficiency.

Burning Fuels in Piles or Windrows: Fuels concentrated into piles or windrows generate greater heat and burn more efficiently. A greater amount of the consumption occurs in the flaming phase and the emission factor is lower. This technique is primarily effective in forest fuel types but may have some applicability in brush types also. Concentrating fuels into piles or windrows generally requires the use of heavy equipment that can have a negative impact on soils and water quality. Piles and windrows also cause temperature extremes in the soils directly underneath and can result in areas of soil sterilization.

Backing Fires: Flaming combustion is cleaner than smoldering combustion. A backing fire takes advantage of this relationship by causing more fuel consumption to take place in the flaming phase than would occur if a heading fire were used. In applicable fuel types, the flaming front backs more slowly through the fuel bed and by the time it passes, most available fuel has been consumed so the fire quickly dies out with very little smoldering. This technique is only applicable in fuel types where the primary ground fuel is grass, litter, and/or very fine woody fuels. Without continuous fine fuels (grass, leaves, needles), backing fire spread is impossible. Generally, the emission reductions obtained from a backing fire are minimal and may not be cost-effective.

“Air Curtain Destructor” Pit Incinerators: Burning fuels in a pit with the aide of a powerful fan-like device to force excess oxygen into the combustion process results in a very hot fire that produces little smoke. These devices are commonly used to burn land clearing, highway rights-of-way or demolition debris in smoke-sensitive areas and may be required by air quality agency regulations in some areas.

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